

are stored as part of the road network. A Road-Division Data Model (as defined hereafter) is a model that defines the road network and supports associating attributes and events with positions in the road network. This data can be queried to generate reports and rendered to generate maps.

- 5 **[0043] Spatial data.** Spatial data is data tied to a position in the road network (e.g., road characteristics) or tied to a coordinate location (e.g., wetlands, airports). In the exemplary embodiment, most of the data in the TIS is spatial. The system and method described herein accommodates both types of spatial data. Some interchange between these two types of spatial data is also supported by
- 10 generating road characteristic values from polygonal boundary data (e.g., assigning a county attribute to the road based on the polygonal boundaries for the counties). The spatial data can be queried to generate reports and rendered to generate maps.

- 15 **[0044] Relational data access.** Relational data access refers to data that is accessible through traditional relational database tools and is presented to a user in a tabular display. Although most data in the exemplary embodiment is spatial in nature, most users are accustomed to accessing road network data through relational database tools. Thus, the system and method includes software that presents data as tabular query results and reports. Standard
- 20 relational database tools (e.g., Microsoft® Access database) can also be used to access the TIS data.

[0045] GIS access. GIS access refers to the ability to access geographic

information system data in the manner traditional to GIS systems (i.e., producing maps). One of the powers of the data model of the present invention is the ability to produce maps that describe and relate the data.

5 Software that presents a number of standard maps of the data is provided in the system and method. Standard GIS tools (e.g., ArcView available from ESRI, Inc.) can also be used to access the TIS data using an open architecture.

[0046] Historical data. Historical data is data that is identified by a time when it

was valid data, but may no longer be valid at the current time. It is desirable to maintain a historical record of data in a TIS. The present invention is designed to maintain a historical record of data by time stamping database records with a birth and end (or expiration) date. In this way, data can be queried as it existed at any specified time, and time-series analysis of the data can be performed.

15 **[0047] Extensibility.** Extensibility of a system or data model allows the system or model to be extended easily with additional entities or attributes or types of data. This is usually due to a framework that is previously designed and easily extended without it being necessary rewrite computer code. Existing TIS and TSAF systems currently maintain a large number of segregated and independent databases. When the system and method are initially implemented for a specific system, many of these independent databases may either be incorporated into the system, or will be replicated in the system for

enterprise-wide access. However, it is expected that users of the system will want to extend it to incorporate additional data in the future. The present invention includes a Data Dictionary that contains meta-data about the data elements in the system and thus can be extended to incorporate additional data elements with minimal modifications to the software.

[0048] Accountability. Accountability means that changes to data or infrastructure can be tracked, thus making the user who modifies the data accountable for the changes. In the context of the exemplary embodiment, GDOT requires a level of accountability. Some of the data is critical to operations, and it is important to monitor the changes to that data. Thus, the system maintains a record of data maintenance activities and the data affected by those activities.

[0049] Locking. Locking is locking of data so that it cannot be modified for the period of time in which it is locked. Some implementations of the system and method may require that certain data be held static for an extended period of time while data collection processes collect new data. Therefore, the system and method supports locking, also known as data locking, of both the geographical definition and attributes for specified sections of road and for other system Entities.

[0050] Anchor LRM. An Anchor LRM is the core linear referencing method used to store the data defining the location for any object whose location is associated with the road network. The Anchor LRM comprises a collection of Anchor Sections and a linear measure along each Anchor Section. A location